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On the Magellanic Nudibranch *Gargamella immaculata* Bergh, 1894, and its synonymy to *G. latior* Odhner, 1926

(Gastropoda, Nudibranchia, Kentrodorididae)

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Several specimens of *Gargamella immaculata* Bergh, 1894 from shallow waters off central and southern Chile were studied alive and by means of dissection. This species is redescribed for the first time from living specimens and information on their ecology is included. The observed range of external and internal morphological variation includes that of *Gargamella latior* Odhner, 1926, whose type specimen has been reexamined. The latter species is therefore considered to be a junior synonym of *G. immaculata*.

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Introduction

Approximately 50 different nudibranch species have been reported from the littoral zone of southern Chile, Patagonia and the Falkland Islands, which comprises the Magellanic faunal province. This is mainly a result of collecting by international expeditions and species descriptions by D'Orbigny (1835-1846), Gould (1852), Cunningham (1871), Abraham (1877), Rochebrune & Mabille (1891), Bergh (1884; 1894; 1898), Eliot (1907), Odhner (1926), Marcus (1959) and Kaiser (1980). Unfortunately, several species which were found during the last century remain inadequately described for their re-identification, and in this century many new species were established based on a few preserved specimens without knowing their specific morphological and geographical range. The consequence is an accumulation of poorly known or similar species being separated only by external characters or small anatomical differences and having wide geographical distances between their type localities. Revising the genera *Bathydoris* and *Austrodoris*, Wägele (1989, 1990) was the first to show that there is a wide intraspecific variability regarding external structures, body proportions and anatomical characters within several magellanic and antarctic dorid species. It has recently been found that several magellanic nudibranch species known from Patagonia have wide geographical ranges which can extend far into central and northern Chile (Schrödl, 1997).

Two similar magellanic species belong to the genus *Gargamella* Bergh, 1894: The type species *Gargamella immaculata* Bergh, 1894 was described from 2 preserved specimens. Later, Odhner (1926) found 10 additional specimens of *G. immaculata*, and he also established a new species, *G. latior* Odhner, 1926, based on a single preserved specimen which had a conspiciously broader mantle rim. Marcus (1959) separated the two species using minor external and radular differences and he also distinguished differences in the structure of the vas deferens. In separating these two species, Marcus' material differed from Odhner's data concerning certain intestinal and reproductive characters.

Since both, intraspecific variability and the wide geographical ranges of magellanic nudibranchs, were not known at the time that these *Gargamella* species were originally described, a study was initiated to determine which anatomical features best characterize the species. Observations on living animals were made for the first time and some aspects of their natural history described. The morphological variability regarding taxonomically important external, digestive and reproductive characters is compared with that of the type material of *G. latior* which was reexamined by the author.

Material and Methods

During the years 1991-1995 Scuba diving was used several times to look for nudibranchs at the Bahía de Coliumo, central Chile. Additional specimens of *Gargamella immaculata* Bergh, 1894 were found at Queule, near Valdivia, and in the Seno Otway, near Punta Arenas, in January 1995 (Fig. 6; Tab. 3). The nudibranchs were observed in situ and their habitat was noted. After collection, the 30 living nudibranchs and their spawn were externally described and measured using the maximal values of length, width and height of the crawling specimens. Some specimens were kept in aquaria for observation and to collect their faeces. The nudibranchs were relaxed using a 10 % $MgCl_2$ solution and fixed in 70 % ethanol together with their spawn. Twelve of the larger specimens were measured in their preserved condition and dissected. Two voucher specimens from Seno Otway were deposited in the Swedish Museum of Natural History, Stockholm (SMNH) under the number 1567, another specimen in the Zoologische Staatssammlung München under the number 19960725. Additionally, the holotype of *Gargamella latior* Odhner, 1926 (SMNH, no. 1015), 9 specimens of *G. immaculata* det. Odhner, 1926 from Burdwood Bank (SMNH, no.'s 584, 585), one specimen of *G. immaculata* det. Odhner, 1926 from Northern Argentina (SMNH, no. 580), and *G. latior* det. Marcus, 1959 (SMNH, no. 1519) were reexamined.

Results

External morphology. The 30 living specimens observed were homogeneously coloured in white, yellow or orange (for colour photographs see Schrödl 1996). Generally the rhinophores were somewhat darker. After preservation all specimens lost their colour becoming whitish grey or yellowish. Living specimens of this oval-shaped and rather flattened dorid species ranged from 7-50 mm in length, 4-31 mm in width and reached up to 10 mm in height. The dorsum is densely covered by slender caryophyllidia of various size giving the white specimens a characteristic fuzzy appearence (Fig. 1A) which Marcus (1959) described as "they look like they are wearing a polar bear coat". In preserved specimens the diameter of the caryophyllidia ranges between a half and a third of their height. The caryophyllidia usually reach about 0.2-0.3 mm in length, in the largest specimen a few are up to

Tab. 1. List of *Gargamella immaculata* specimens anatomically examined.

Specimen No.	Location	Colour in life	Body length live; fixed [mm]	Free mantle rims/body breath	Radula dimensions [mm]	Radula formula	No. of vestibular hooks
1	Coliumo	orange	19; 15	0.35	2.7×2.1	80×79.0.79	6
2	Coliumo	orange	18; 12	0.50	2.8×1.9	60×73.0.73	5
5	Coliumo	orange	46; 28	0.50	4.8×3.5	91×98.0.98	7
6	Coliumo	yellowish	50; 40	0.45	5.5×4.2	88×95.0.95	6
7	Coliumo	orange	30; 23	0.65	4.5×3.3	79×84.0.84	6
8	Coliumo	white	29; 22	0.65	4.2×2.8	71×81.0.81	7
14	Seno Otway	yellow	–; 26	0.40	4.8×3.5	67×85.0.85	7
15	Seno Otway	yellow	48; 31	0.60	4.2×3.4	63×80.0.80	5
16	Seno Otway	yellow	–; 22	0.60	3.5×3.0	68×81.0.81	6
20	Queule	white	–; 17	0.55	3.9×3.2	69×79.0.79	5
21	Queule	white	–; 15	0.35	3.2×2.9	73×89.0.89	5
22	Queule	orange	–; 14	0.35	3.6×2.9	68×84.0.84	6

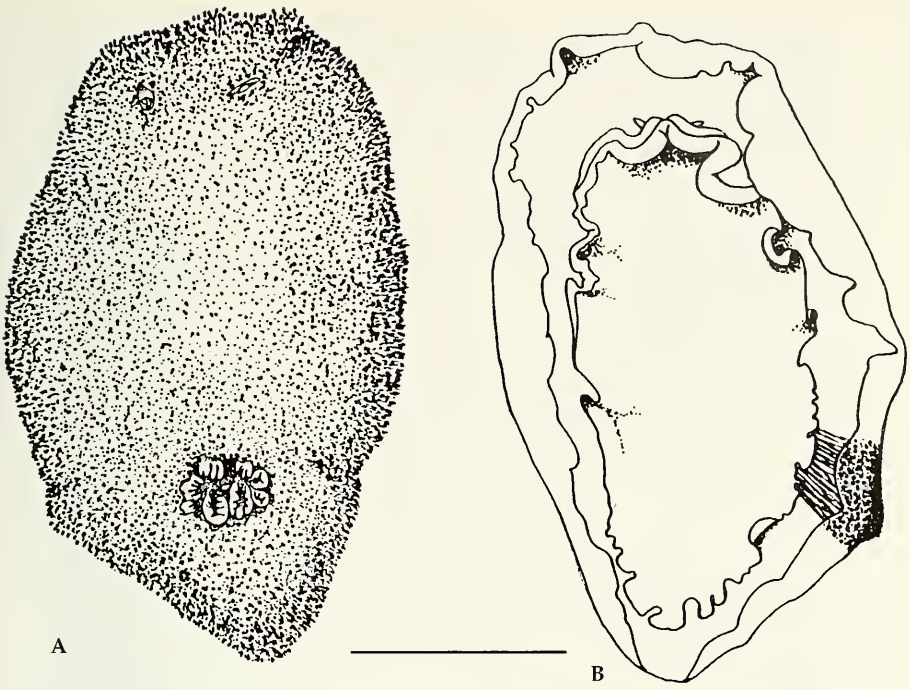

Fig. 1. External morphology of *G. immaculata* (drawn from photographs of the preserved specimen 1). **A.** Dorsal view. **B.** Ventral view. Scale bar: 0.5 mm.

0.8 mm. The rounded tip of the papilla is surrounded by 4-8 needlelike spicules. Ventrally, lines of radial spicules or connective fibres are visible through the transluscent mantle (Fig. 1B).

Rhinophoral sheaths are slightly elevated in living specimens, slightly or not at all elevated in preserved ones, and covered with average sized caryophyllidia. The smallest specimens possess about 10 rhinophore lamellae, the largest ones up to 18. The branchial sheaths are sometimes slightly elevated. Eight to twelve bi- or tripinnate branchial plumes surround the anal papilla in a complete circle. The expanded gills reach up to 12 mm in diameter in the largest living specimen.

The oral tentacles are long and digitiform in living specimens. In preserved ones, tentacles may be long and slender or heavily contracted and flattened lobes, even in the same individual. The foot was narrow in living specimens, but its width varied depending on the mode of movement. In preserved material, the foot width reaches $^1/_3$ to $^2/_3$ of the total body width (Tab. 1). Anteriorly, the foot is bilabiate, the upper lip is notched in the middle. At its posterior end the foot is slightly tapered.

Internal morphology. Twelve preserved specimens with a length varying from 12-40 mm were dissected. The blood gland covers the cerebral system forming an anterior longitudinal and a posterior transverse lobe. An outline of digestive and reproductive organs in situ is given in Figure 2. The positions and dimensions of these organs generally agree with Odhner's descriptions (Odhner 1926), but vary considerably regarding different specimens: Usually the ample prostate fills the anterior left side of the body between the pharynx, the median tubular esophagus and posteriorly, the digestive gland, and is visible in a dorsal view (Fig. 2A). In some specimens the esophagus forms a more or less large loop partly covering the prostate (Fig. 2B). In several individuals the prostate has a more median position, in one specimen it lies to the right of the esophagus under the digestive gland (Fig. 2C).

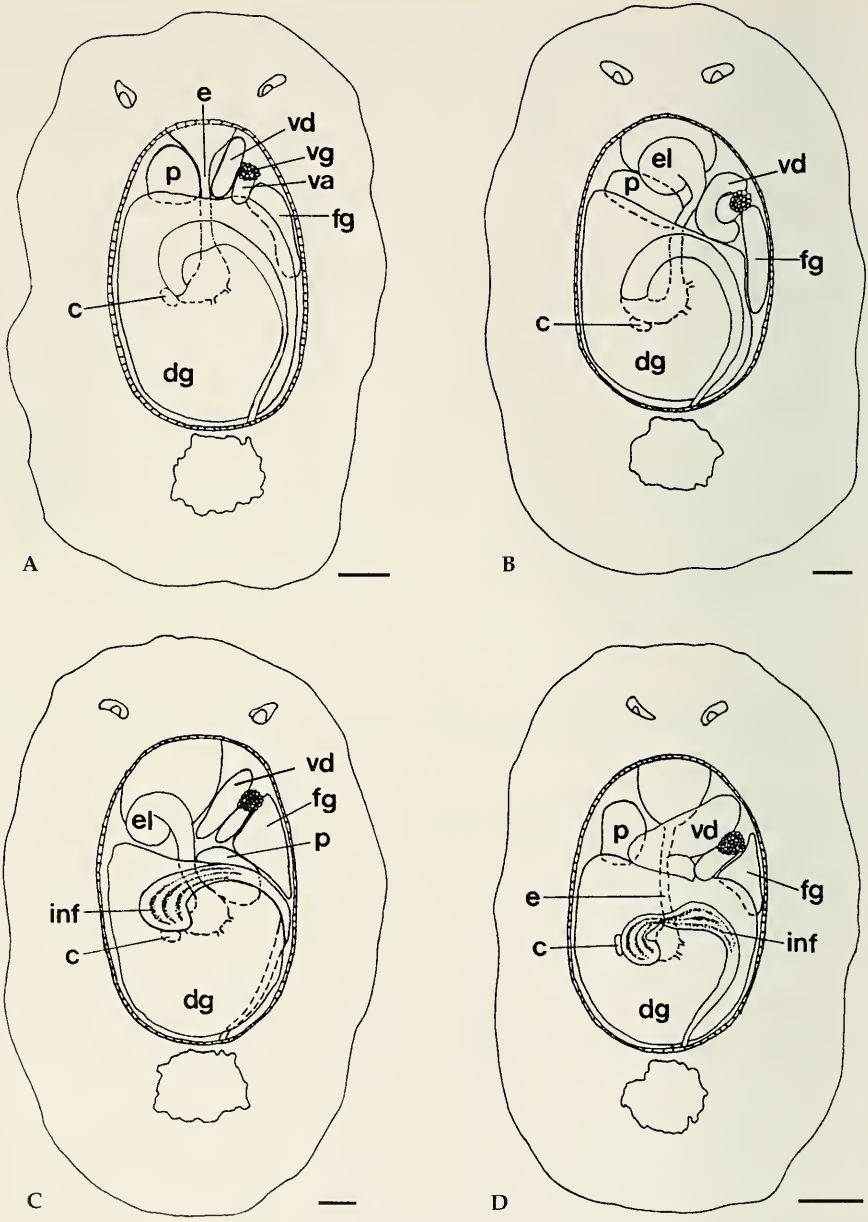

Fig. 2. Variation of internal organs in *G. immaculata*; stylized drawings from photographs of dorsally opened specimens. **A.** Usual positions (specimen 1). **B.** Looped esophagus (specimen 8). **C.** Looped esophagus, prostate displaced to the right body side (specimen 7). **D.** Long vas deferens extending to the left side, caecum reaching the liver surface, strongly folded proximal intestine (specimen 2). **c.** Caecum. **dg.** Digestive glands. **e.** Esophagus. **el.** Esophagus loop. **fg.** Female glands. **inf.** Intestinal folds. **p.** Prostate. **va.** Vagina. **vd.** Vas deferens. **vg.** Vestibular gland. Scale bars: 0.2 mm.

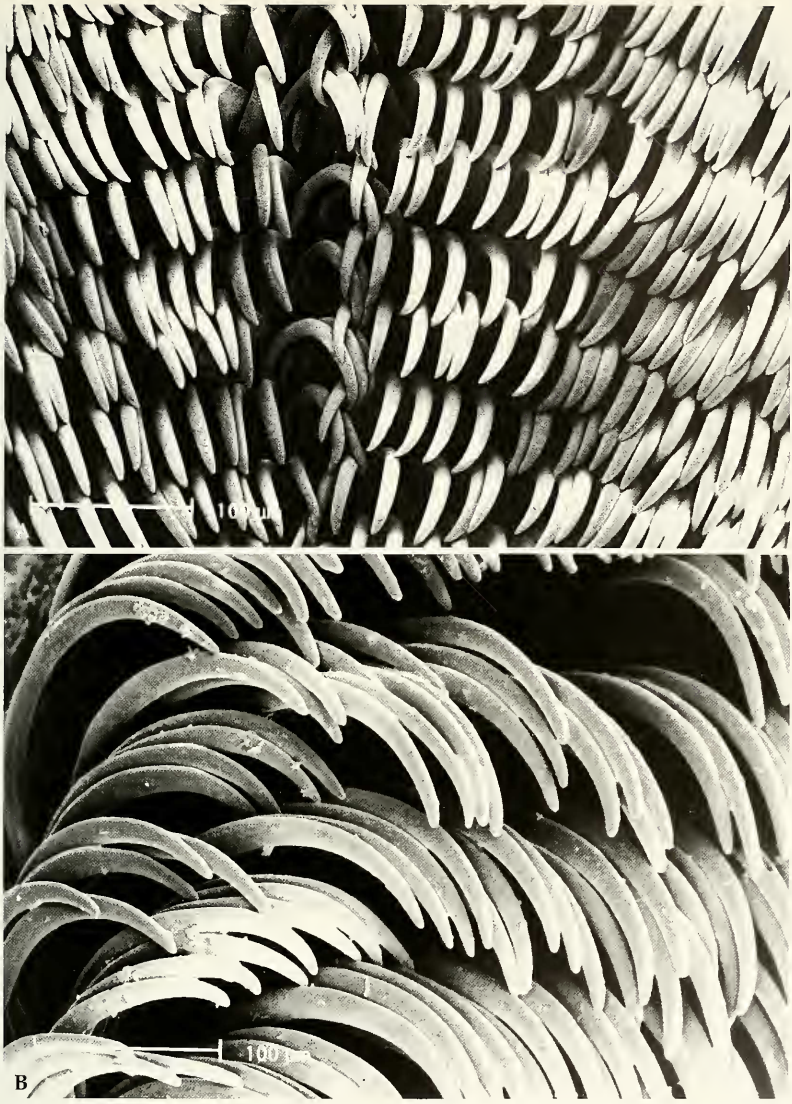

Fig. 3. Radula of *G. immaculata* (specimen 5). **A.** SEM-photograph of inner lateral teeth. **B.** SEM-photograph of outer lateral teeth. Scale bars: 0.1 mm.

In the anterior right body portion the vas deferens, the granular vestibular gland, the large vagina and the female gland mass are visible. Usually the distal part of the vas deferens which is ensheathed by a muscular layer is limited to the right body side (Fig. 2A-C), but in several specimen the vas deferens extends into the left body portion crossing the pharynx and covering the esophagus and parts of the prostate (Fig. 2D).

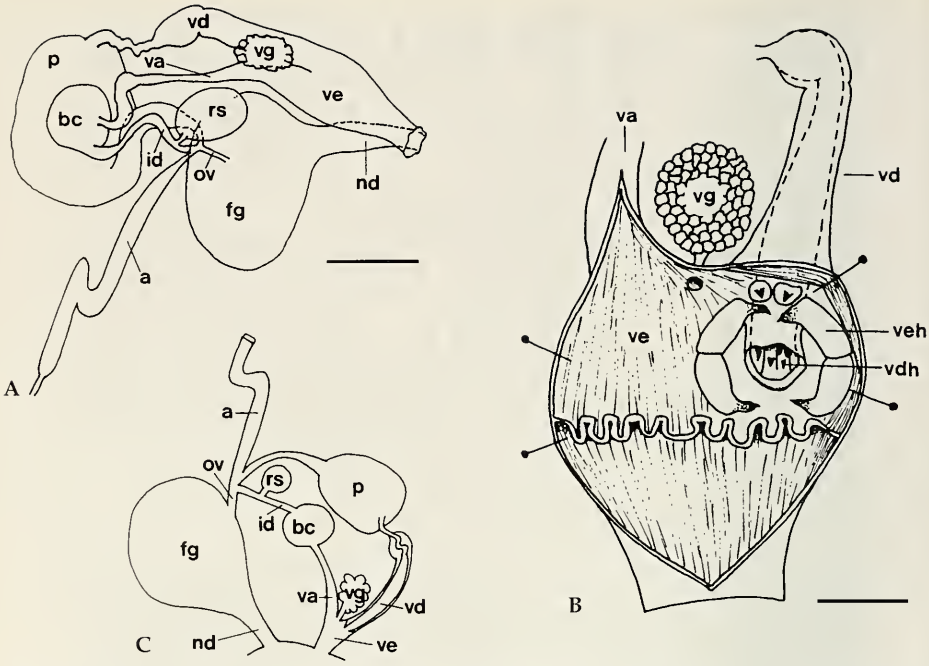

Fig. 4. Reproductive organs of *G. immaculata*. **A.** Reproductive system of specimen 7 in situ (dorsal view). **B.** Vestibular structures of specimen 6. **C.** Schematic outline of the genital system. **a.** Ampulla. **bc.** Bursa copulatrix. **fg.** Female glands. **id.** Insemination duct. **nd.** Nidamental duct. **ov.** Oviduct. **p.** Prostate. **rs.** Receptaculum seminis. **va.** Vagina. **vd.** Vas deferens. **vdh.** Vas deferens hooks. **ve.** Vestibule. **vg.** Vestibular gland. **veh.** Vestibular hooks. Scale bars: 1.0 mm.

Digestive system. The smooth labial cuticule is transparent, yellowish or brownish. The radula reaches 5.5 × 4.2 mm in the biggest specimen and consists of 60-91 rows with 73-98 simply hooked and rather uniform teeth per half row (Tab. 1, fig. 3). The teeth are very dense near the rhachis, but a rhachidian tooth is absent. The maximum tooth height is reached in the centre of the half rows and measures up to 0.25 mm, inner and more lateral teeth are slightly smaller. The smallest studied specimen totally had 60 rows, but only 44 of these were fully developed. The salivary glands are ribbon-like and thin. The esophagus may be tubular or widened, sometimes forming a loop partly covering the pharynx before extending straight backwards to the stomach (Fig. 2). The stomach lies medially within the digestive gland and bears on the left side a small bulbous caecum which reaches the surface of the digestive gland in some specimens (Fig. 2D). The intestine extends to the top of the digestive gland in a wide loop to its anterior border and then follows its right edge backwards to the anal papilla. The inner epithelium of the esophagus and of the anterior part of the intestine is more or less folded longitudinally. In some specimens the intestinal folds are well developed and strengthened, but there is no typhlosolis (Fig. 2D). The various portions of the stomach and the intestine may be more or less swollen; only the distal part of the intestine constantly forms a thin tube. In all specimens the stomach and the intestine are partly filled with brownish masses containing spicules of sponges and sand granules.

Reproductive system. An overview of the reproductive system is given in fig. 4. The ovotestes cover the surface of the digestive gland. The thin hermaphroditic duct is long and about 150 µm in diameter. It passes into an up to 0.5 mm thick ampulla which is closely attached to the prostate. After a conspicious loop a thinner duct leads to the female gland mass where it divides into a short oviduct

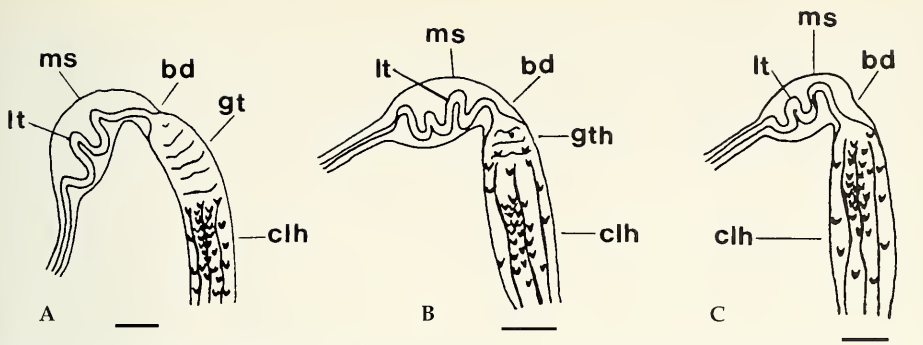

Fig. 5. Scheme of vas deferens variation in *G. immaculata*. **A.** Specimen 1. **B.** Specimen 8. **C.** Specimen 20. **bd.** Bend. **clh.** Cuticular longitudinally folded part with hooks. **gt.** Glandular transversely folded portion without hooks. **gth.** Glandular tranversely folded portion containing hooks. **lt.** Looped central tube. **ms.** Muscular sheath. Scale bars: 1.0 mm.

entering the female gland mass and the broader, flattened, vas deferens. The latter widens to 6 mm forming an amply rounded prostate and afterwards continues as a broad duct. After a curve the vas deferens passes into a thin, curved tube which is ensheathed by a muscular layer. Fusing with the vestibular sheath, this muscular layer suddenly widens bearing internally a thin central tube which usually forms several loops (Fig. 5). Where the vas deferens is externally more or less constricted and bent, internally the thick muscular sheath usually disappears and the central tube widens into an ample lumen. In the following portion of the vas deferens its lumen is covered by soft, transverse folds. Between these folds usually there are some small translucent cuticular hooks. Before ending in the vestibule, the epithelial lumen of the vas deferens is covered by a strong cuticular wall bearing many irregularly longitudinal folds. These folds bear conspicuous brownish hooks, especially in the dorsal posterior area, where in several specimens cuticular folds with up to 40 strong hooks are aggregated. Ventrally, near the vestibular opening of the vas deferens, there is another area where hooks may be concentrated. Beside these aggregations, in all specimens there are randomly distributed hooks. The total number of hooks varies between about 60 to 100 in the different specimens. The hooks have a diameter up to 0.15 mm at their base and a height up to 0.1 mm. The most distal cuticular part of the vas deferens passes into the vestibular wall. In some specimens the distal vas deferens is slightly everted into the vestibule (Fig. 4B). Marcus (1959) showed that on an individual of *G. immaculata* the cuticular hooked part of the vas deferens can be completely everted forming a shaft.

This complex structure of the distal vas deferens and the proportions of its different parts may vary considerably (Fig. 5): In several specimens a long transversely folded, glandular zone without hooks is present between the portion with a looped central tube and the part with longitudinally folded cuticle and hooks (Fig. 5A), as described in *G. immaculata* by Marcus (1959). In other specimens, the transversely folded zone may be short containing many hooks (Fig. 5B), or may be absent (Fig. 5C) as described in *G. latior* (Marcus 1959). In the two largest dissected specimens, the central tube after the bend of the vas deferens continues for some distance as a thin, more or less looped duct before widening into a lumen.

Around the opening of the vas deferens into a common vestibule, the fused vas deferens and vestibular wall forms a thickened cuticular ring containing 5, 6 or 7 very strong hooks (Fig. 4B). Laterally there are two fused hooks on each side which reach a length up to 1.5 mm, dorsally there are 1-3 separate hooks with a diameter up to 0,5 mm. Beside these structures the cuticular and folded vestibular wall lacks further hooks. The rounded and flattened, granular vestibular gland, which measures up to 1.5 mm in diameter, enters the vestibule with a short duct. The vagina is ample, its walls are longitudinally folded, cuticular, but softer than those of the vas deferens and without hooks. The vagina narrows to a thin duct before passing into the spherical bursa copulatrix which reaches a diameter up to 3 mm and is covered by the prostate. Separately from the insertion of the vagina the vaginal duct leaves the bursa copulatrix, runs adjacent to the proximal vas deferens and forms a narrow

Fig. 6. Distribution of *G. immaculata*.

loop where the short duct of the oval receptaculum seminis inserts. The insemination duct enters the oviduct near its separation from the spermoviduct. The oviduct leads into the female gland mass which can be separated into rounded yellowish lobes of the albumen gland and the translucent mucous gland. The nidamental duct opens under the vestibular opening.

Habitat. All specimens were found in semiprotected bays on stony or hard substrates, often on vertical rocks near encrusting sponges, at 1 to 11 m depth.

Food. In the Bahía de Coliumo some specimens of *G. immaculata* were observed to feed on yellow encrusting demosponges. The orange body (and spawn) colouration of most specimens found in the Bahía de Coliumo may be the result of pigment accumulation from these yellow sponges. However, there were also a few large whitish specimens from this locality (see Tab. 1). In the intestinal system of all dissected specimens, spicules of sponges and sand granules were found. The intestine of one specimen contained a 5 mm long hydrozoan tube.

Life cycle and reproduction. From the literature and personal data, specimens of *G. immaculata* were found during the whole year with exception of the winter months June to August. Generally, collecting conditions in southern waters are poor in these months and a permanent occurence of *G. immaculata* is probable.

Tab. 2. Comparative information on external and internal morphological characters of all known specimens of *Gargamella immaculata* including the results of the reexamination of *G. latior* Odhner, 1926, *G. immaculata* det. Odhner, 1926 and *G. latior* det. Marcus, 1959. Bibliographic data in quotation marks.

Author	Bergh, 1894	Odhner, 1926			Marcus, 1959		this paper
Species	*G. immaculata*	*G. immaculata*	*G. immaculata*	*G. latior*	*G. immaculata*	*G. latior*	*G. immaculata*
Collecting site	"ENE off" Cabo Delgado	"Off northern Argentina"	"Burdwood Bank"	"Ultima Esperanza"	"Chiloé" St. M 21; St. M 42; St. M 98	"Chiloé St. M 24"	Bahía de Coliumo Queule Seno Otway
No.specimens reported and notes	"2"	1, partly dissected (SMNH, no. 580)	9, 4 specimens partly dissected, 5 entire (SMNH, no's 584, 585)	1, partly dissected (SMNH, no. 1015)	"7"	1, heavily dissected, only parts of the mantle preserved (SMNH, no. 1519)	30, 12 specimens partly dissected
Legth/width/ height [mm] (preserved)	"20/11/9"	12/9/9	max. 20/16/10	15/14/6 foot contracted	"13-22/8-18/up to 12. Along the dorsal surface of M 98: 45 mm long"	"17/11/- deformed	"12-40/7-26/3-14
Width free mantle rim/total body width	"1/3"	1/9 contracted	2/5-1/2	2/3	"M 98: 3/5"	2/3	1/3-2/3
Tubercle shape	"dense small cylindrical tubercles"	"very dense papillae, upto 0,3 mm high, their point surrounded by 4-7 long spicules"	"small papillae up to 0,2 mm high, around their point up to 10 small conical prolongations". No spicules.	"Dense caryophyllidia up to 0,15 mm in height and 40-60 µm in diameter"	"Up to 0,15 mm high caryophyllidia. Spicules dissolved"	"Up to 0,2 mm high caryophyllidia. Each bears 5-7 spicules"	Slender caryophyllidia mostly up to 0,3 mm in height and about 0,1 mm in diameter.4-8 needle like spicules
Number of gills	8 tripinnate	9 bipinnate	9-11 bipinnate	9 bipinnate	"M 42: 7 bitripinnate M 21, 98: 10 tripinnate"	"8 bipinnate"	8-12 bi-tripinnate
Radula formula	"46-48×(60-67.0.60-67)"	–	"42×(80.0.80)" incomplete parts	63×(71.0.71)	"46-68× (77-90.0.77-90)"	70×(75.0.75)	60-88×(73-95.0. 73-95)
Intestinal structure	not mentioned	folded but soft	smooth-folded, soft-slightly hardened	hardened and folded	not mentioned	not mentioned	smooth-folded, soft-slightly hardened
Total number of vas deferens hooks (aprox.)	"100"	–	"well described by Bergh", not examined in detail	"many" not examined in detail	"40"	"80 or more"	60-100
Number of vestibular hooks	–	6	–	–	"about 5"	"7"	5-7

Two pairs copulated in the laboratory in April 1992. One pair copulated in situ and in aquaria in March 1994. Also in March 1994, some spawn could be found in situ on vertical rocks surrounded and well camouflaged by yellow sponges at 2 m depth. The spawn was an orange, 2 mm broad ribbon forming a spiral with a diameter of 2.5 cm. The preserved ribbon contains single, round white eggs with a diameter of 100-120 µm, each one within a rounded to oval capsule of 120-150 µm diameter.

Discussion

The specimens described here all belong to the same species. Examination of their external and internal morphology shows considerable variation regarding some characters. However, there are always intermediate forms and there are no specimens which are extreme in a number of important characters. Copulations have been observed between a wide range of specimens in the aquarium. According to Edmunds (1982) mating indicates conspecifity between nudibranchs. Specimens collected in the Seno Otway appear to have more gills with fewer branches than specimens from the northern locations (10-12 bipinnate vs. 8-10 bi-tripinnate). However, no other tendencies are evident when comparing different populations (see Tab. 1).

The species examined belongs to the genus *Gargamella* Bergh, 1894 which is caracterized by its densely tuberculate dorsum, its characteristic armature of the vas deferens, the presence of a vestibular gland and of a well developed prostate (Bergh, 1894). It differs from the poorly known *Gargamella novozealandica* Eliot, 1907 by its rounded anterior foot margin which does not bear projections, and its much higher number of radular rows and teeth (60-91 × 73-95 vs. 18 × 20). From *Homoiodoris novzealandiae* Bergh, 1904, which was presumed to be a *Gargamella* by Odhner (1926), it differs clearly by its higher number of radular rows and teeth per half row (60-91 × 73-98 vs 26-29 × 31-36), its simple hookshaped, not denticulate radular teeth and by its ungrooved labial tentacles (Bergh 1894). Due to its uniform white to orange colouration, this Chilean species can be easily distinguished from the two dark spotted and not yet internally described *Gargamella* species found in South Africa by Gosliner (1987). The specimens described here show characters of the two known Chilean species, *Gargamella immaculata* Bergh, 1894 and *G. latior* Odhner, 1926.

Tab. 2 shows the range of variation of taxonomically important characters of the here described specimens comparing it with the available bibliographic data of *G. immaculata* and *G. latior*, which is supplemented by the reexamination of the type specimen of *G. latior* Odhner, 1926, the specimens assigned to *G. immaculata* by Odhner (1926) and the specimens assigned to *G. latior* by Marcus (1959). The living material is white, yellowish or orange, but uniform in colouration. After fixation it becomes grey white in colour as was the reexamined museum material. The 12 preserved specimens dissected during this study, with lengths from 12-40 mm, cover the bibliographic range and extend the maximal preserved length from 22-40 mm. Regarding the nominal character of *G. latior*, the width of the free mantle rim, Bergh (1894), Odhner (1926) and Marcus (1959) reported free mantle rims of approximately $^1/_3$ to $^1/_2$ of the total body width for *G. immaculata* and Odhner and Marcus of about $^2/_3$ for the two known specimens of *G. latior*. Observations of the living material showed that they had broad, but due to their movement, variable widths of the free mantle rims. After preservation they measured $^1/_3$ to $^2/_3$ of the entire body width and therefore include the range of all known Chilean specimens of both *Gargamella* species (Tab. 2). Regarding the form, dimensions and density of the tubercles, *G. immaculata* cannot be distinguished from *G. latior* by bibliographic data, nor from the specimens examined in this study. Further external characters used to distinguish *G. latior* from *G. immaculata*, like elevated rhinophorical sheaths, or shape and direction of the labial tentacles (Odhner 1926, Marcus 1959), are variable in the specimens examined and strongly influenced by preservation.

Odhner (1926) noticed different numbers of radular rows when comparing *G. immaculata* with his single specimen assigned to *G. latior*. According to Marcus (1959) the number of 42-68 radular rows and 60-90 teeth per half row of *G. immaculata* nearly covers the variation known from *G. latior* (63-70 × 71-75.0.71-75). As seen during the reexamination of the material studied by Odhner, the apparently smaller number of radular rows in *G. immaculata* is partly due to his examining a damaged radula having 42 rows but lacking an unknown number of additional rows. The specimens described here possess 60-91 rows and 73-98 teeth per half row. The increase in rows of teeth and teeth per half row is due to larger body sizes of the examined material (Tab. 1). According to Odhner (1926) the proximal intestine of *G. latior* is characterized by strong cuticulary structures, in contrast to *G. immaculata* which

has a soft intestinal wall. However, Marcus (1959) did not mention any intestinal cuticle in his specimen assigned to *G. latior*. In the 12 specimens dissected during this study the digestive system shows a great variability in structure and position (Fig. 2): Whereas in several specimens the intestinal wall was folded, in other specimens it was less or none at all. Reexamination of the five partly dissected specimens assigned to *G. immaculata* by Odhner shows that there are transitional stages with more or less folded and somewhat hardened intestinal walls, even though none were as strongly hardened as in the type specimen of *G. latior*; this may be a preservation artifact.

Odhner (1926) did not notice any differences when comparing the reproductive system of *G. immaculata* and his individual of *G. latior*, but Marcus (1959) found that his single *G. latior* possessed about 80 hooks in the vas deferens and lacked a glandular soft-walled part of the vas deferens, whereas specimens he assigned to *G. immaculata* only possessed about 40 hooks and a hook-free glandular part was present. In addition, his *G. latior* had more large vestibular hooks than his *G. immaculata* (7 vs. 5). Nevertheless, Marcus (1959) himself doubted the taxonomical importance of these reproductive differences. The data presented in this study show clearly that the total number and the positions of the about 60-100 hooks in the vas deferens can vary considerably in different specimens. Moreover, it is difficult to detect small translucent hooks between the soft folds of the vas deferens in specimens considered to be *G. immaculata* and so some hooks could have been overlooked. There are transitional stages ranging from the presence of a long, transversely folded part of the vas deferens to its complete absence. The number of vestibular hooks seen in the specimens examined in this study is 5, 6 or 7 which encompasses the range reported for both, *G. immaculata* and *G. latior*.

Lacking further distinguishing features, it must be stated that all known specimens assigned to *Gargamella immaculata* or *G. latior* lie nearly completely within the range of variation of the newly collected material of the species examined during this study. Consequently, *Gargamella latior* Odhner, 1926 must be considered a junior synonym of *Gargamella immaculata* Bergh, 1894.

The morphological variability shown by this species confirms the conclusion of Wägele (1990), that Odhner (1926), and also Marcus (1959) as the most important subsequent author, sometimes overstressed the taxonomical importance of minor details in their studies of magellanic nudibranchs. The wide range of morphological and anatomical variation in *G. immaculata*, suggests that a review of several other Chilean and Patagonian nudibranch species, using sufficient material examined live, would give greater knowledge about a fauna which has been scientifically neglected for several decades.

Zoogeography. The known geographical range of *G. immaculata* extends from Argentina (37°50'S, 56°11'W) and the Burdwood Bank (Odhner 1926) in the Atlantic to Patagonia (Bergh 1894, Odhner 1926), Chiloé Island (Marcus 1959) and Bahia de Coliumo, central Chile (Schrödl 1997), in the southeastern Pacific. In addition, *G. immaculata* was found in this study at Queule, Valdivia and Seno Otway, near the Magellan Strait (Fig. 6, tab. 3). Ranging from northern Argentina over Patagonia to central Chile, *G. immaculata* shows a typical magellanic distribution with an overlap into the Peruvian faunal Province north of Chiloé Island (41°S). The genus *Gargamella* seems to be limited to the cold-temperate and subantarctic waters of the southern hemisphere, species are exclusively reported from New

Tab. 3. Known records of *Gargamella immaculata*.

Species	Collecting Locality
Gargamella immaculata Bergh, 1894	'ENE off Cabo Delgado' (42°24'S, 56°23'W (p. 158) or 42°24'S, 61°38'W (p. 172))
Gargamella immaculata det. Odhner, 1926	'North of Argentina' (37°50'S, 56°11'W, Odhner 1926). Burdwood Bank (53°41'S, 61°09'W, Odhner 1926) or 53°45'S, 61°10'W (labels of the museum's material))
Gargamella latior Odhner, 1926	Ultima Esperanza (51°40'S, 72°40'W)
Gargamella immaculata det. Marcus, 1959	Gulf of Ancud (41°48'50"S, 73°09'40") Gulf of Ancud (42°20'50"S, 73°22'00"W) Northern Chiloé (41°50'10"S, 73°51'20"W)
Gargamella latior det. Marcus, 1959	Reloncaví (41°44'25"S, 72°55'45"W)
Gargamella immaculata det. Schrödl (1997)	Bahía de Coliumo (36°32'S, 72°57'W)
Gargamella immaculata (present paper)	Queule (39°23'S, 73°13'W) Seno Otway (53°07'S, 71°22'W)

Zealand, the magellanic area and Southern Africa (Gosliner 1987).

Concerning vertical distribution, a total of 51 specimens of *G. immaculata*, including *G. latior*, were collected between 1 m and 140-150 m depth. Contrary to Marcus (1959), who regarded *G. immaculata* as a deeper water species, in the present study it is shown to be a common species in the shallow water of the Bahía de Coliumo, Queule and Seno Otway.

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